

# PATENT ABSTRACTS OF JAPAN

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## (54) CEMENTATION-PROOFING COATING MATERIAL

### (57)Abstract:

PROBLEM TO BE SOLVED: To provide a coating material which can make a substrate proof against cementation even when applied thereto singly.

SOLUTION: The coating material is prepared by adding 5-40 mass % alkali salts of meta- and ortho-silicic acids to a water glass. In cementing case hardening steel, this material is applied to the part to be made proof against cementation, whereupon the material is solidified in ten and odd to thirty and odd minutes as the result of the evaporation of the water. When this is placed in a cementing oven and heated to 920-960° C, the coating film vitrifies into a gas-impervious film. The heating time is several to several tens hr.

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**CLAIMS**

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[Claim(s)]

[Claim 1] The carburization prevention coating characterized by adding the alkali salt of meta-silic acid or orthochromatic silic acid to water glass 5 - 40mass%.

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**DETAILED DESCRIPTION**

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[Detailed Description of the Invention]

[0001]

[Industrial Application] In case this invention carries out carburization processing of the case hardening steel, it relates to the coating used when carrying out carburization prevention (carburization-proofness) of the part. Only % shows all mass% below.

[0002]

[Description of the Prior Art] The thing of the water glass system containing the thing of the hydrocarbon system which contains spreaders, such as oxidization boron powder and acrylic resin, as a carburization prevention coating and silicon sand, a bentonite, and copper powder is used today.

[0003]

[Problem(s) to be Solved by the Invention] Although the coating of this invention is similar to the coating of the latter water glass system, the coating marketed until now has bad carburization-proofness nature, and it is used, usually giving two coats of it twice. The coating of this invention demonstrates carburization-proofness nature enough by coating once.

[0004]

[Means for Solving the Problem] A carburization prevention coating is heated from several hours at 920-960 degrees C for dozens hours. Under the present circumstances, a paint film must prevent invasion of a carbon monoxide. In this invention, the coating into which various the alkali salt ( $\text{Na}_2\text{SiO}_3$ ,  $\text{K}_2\text{SiO}_3$ , etc.) of meta-silic acid or alkali salt of orthochromatic silic acid, and ratios ( $\text{Na}_4\text{SiO}_4$ ,  $\text{K}_4\text{SiO}_4$ , etc.) of the water glass of a spreader were changed was created.

[0005] If moisture will dissipate if the coating of this invention is applied to case hardening steel, it will solidify if it carries out from about ten minutes for about thirty minutes, and this is put into a carburization furnace and a temperature up is carried out to 900 degrees C or more, a paint film will be vitrified and will prevent invasion of gas.

[0006] Although, as for the water glass of a spreader, No. 1 water glass, No. 2 water glass, and No. 3 water glass were marketed, since the rate of drying was slow, No. 1 and No. 2 water glass used No. 3 water glass by this invention. Next, a part of example of preparation is shown.

[0007]

[Example]

A. 5%  $\text{Na}_2\text{SiO}_3$  to 95% No. 3 water glass B. 25%  $\text{Na}_2\text{SiO}_3$  to 75% No. 3 water glass C. 40%  $\text{Na}_2\text{SiO}_3$  to 60% No. 3 water glass D. 5%  $\text{K}_2\text{SiO}_3$  -- 95% water glass [ No. 3 ] E. 25%  $\text{K}_2\text{SiO}_3$  -- 75% water glass [ No. 3 ] F. 40%  $\text{K}_2\text{SiO}_3$  -- 60% water glass [ No. 3 ] G. 5%  $\text{Na}_4\text{SiO}_4$  to 95% No. 3 water glass H. 25%  $\text{Na}_4\text{SiO}_4$  to 75% No. 3 water glass I. 40%  $\text{Na}_4\text{SiO}_4$  to 60% No. 3 water glass J. 5%  $\text{K}_4\text{SiO}_4$  -- 95% No. 3 water glass K. 25%  $\text{K}_4\text{SiO}_4$  -- 75% water glass [ No. 3 ] L. 40%  $\text{K}_4\text{SiO}_4$  -- 12 kinds of coatings of A-L were created more than 60% No. 3 water glass, and it applied to case hardening steel (JIS:SCM415) once at about 0.2mm thickness. After air drying, it put into the carburization furnace respectively, and carburized at 950 degrees C for 8 hours, and oil-quenching was performed at 800 degrees C.

[0008] Next, when the degree of hardness of the carburization-proofness section of the part which applied the carburization section and a coating was measured, as shown in Table 1, the carburization section was set to 730 or more Hv(s), the carburization-proofness section hardly changed each to the degree of hardness of the material before heat treatment with 350 or less Hv, but it became clear that carburization-proofness ability was excellent. In addition, it also became clear that carburization-proofness ability has bad additions, such as  $\text{Na}_2\text{SiO}_3$  and  $\text{Na}_4\text{SiO}_4$ , a fluidity was bad and 5% or less of things [ no ] could carry out [ coating ]-izing of them as for 40% or more of thing on the other hand. Therefore, the claim of this invention was made into 5 - 40%.

[0009]

[Table 1]

浸炭鋼 S C M 4 1 5 に対する浸炭防止試験

塗料の種類	浸炭部の硬度 (H v)	防炭部の硬度 (H v)
A	7 3 7	3 4 1
B	7 3 9	3 4 1
C	7 3 6	3 4 4
D	7 3 8	3 4 8
E	7 3 8	3 4 3
F	7 3 3	3 4 2
G	7 3 8	3 4 0
H	7 3 5	3 4 5
I	7 3 5	3 4 0
J	7 4 1	3 4 8
K	7 3 9	3 4 7
L	7 3 6	3 4 3

[0010]

[Effect of the Invention] Although all the carburization-proof coating of the water glass system marketed until now needed to carry out two coats twice and paint film thickness needed to be set to about 0.4mm or more, it became clear that the coating of this invention was 1-time coating, and the paint film thickness demonstrated carburization-proofness ability enough by about 0.2mm. Therefore, a coating and wages become half and the economic effects are large.

[Translation done.]



## 【特許請求の範囲】

【請求項1】 メタ珪酸あるいはオルソ珪酸のアルカリ塩を5～40mass%、水ガラスに添加することの特徴とする浸炭防止塗料。

## 【発明の詳細な説明】

## 【0001】

【産業上の利用分野】本発明は肌焼鋼を浸炭処理する際に、一部分を浸炭防止（防炭）する場合に使用する塗料に関するものである。以下mass%はすべて%のみで示す。

## 【0002】

【従来の技術】今日、浸炭防止塗料としては酸化硼素粉末とアクリル樹脂などの展着剤を含む炭化水素系のもの、および珪砂、ベントナイト、銅粉末を含む水ガラス系のものが使用されている。

## 【0003】

【発明が解決しようとする課題】本発明の塗料は後者の水ガラス系の塗料に類するものであるが、これまで市販されている塗料は防炭性が悪く、通常2回重ね塗りして使用されている。本発明の塗料は1回塗りで防炭性を充分発揮するものである。

## 【0004】

【課題を解決するための手段】浸炭防止塗料は920～960℃で数時間から数十時間加熱される。この際、塗膜は一酸化炭素の侵入を防止せねばならない。本発明ではメタ珪酸のアルカリ塩（ $\text{Na}_2\text{SiO}_3$ 、 $\text{K}_2\text{SiO}_3$ など）あるいはオルソ珪酸のアルカリ塩（ $\text{Na}_4\text{SiO}_4$ 、 $\text{K}_4\text{SiO}_4$ など）と展着剤の水ガラスの比をいろいろ変えた塗料を作成した。

【0005】本発明の塗料を肌焼鋼に塗布すると水分が散逸し、十数分から三十数分すると固化し、これを浸炭炉に入れ900℃以上に昇温すると、塗膜はガラス化し、ガスの侵入を防止する。

【0006】展着剤の水ガラスは1号水ガラス、2号水ガラスおよび3号水ガラスが市販されているが、1号および2号水ガラスは乾燥速度が遅いので、本発明では3号水ガラスを用いた。次に調査の実施例の一部を示す。

## 【0007】

## 【実施例】

A. 5%  $\text{Na}_2\text{SiO}_3$  ——95%3号水ガラス  
 B. 25%  $\text{Na}_2\text{SiO}_3$  ——75%3号水ガラス  
 C. 40%  $\text{Na}_2\text{SiO}_3$  ——60%3号水ガラス  
 D. 5%  $\text{K}_2\text{SiO}_3$  ——95%3号水ガラス  
 E. 25%  $\text{K}_2\text{SiO}_3$  ——75%3号水ガラス  
 F. 40%  $\text{K}_2\text{SiO}_3$  ——60%3号水ガラス  
 G. 5%  $\text{Na}_4\text{SiO}_4$  ——95%3号水ガラス  
 H. 25%  $\text{Na}_4\text{SiO}_4$  ——75%3号水ガラス  
 I. 40%  $\text{Na}_4\text{SiO}_4$  ——60%3号水ガラス  
 J. 5%  $\text{K}_4\text{SiO}_4$  ——95%3号水ガラス  
 K. 25%  $\text{K}_4\text{SiO}_4$  ——75%3号水ガラス  
 L. 40%  $\text{K}_4\text{SiO}_4$  ——60%3号水ガラス  
 以上A～Lの12種類の塗料を作成し、肌焼鋼（JIS:SCM415）に約0.2mm厚みに1回塗布した。自然乾燥後、各々浸炭炉に入れ、950℃で8時間浸炭し、800℃で油焼入れを行った。

【0008】次に浸炭部および塗料を塗布した箇所を防炭部の硬度を測定すると、表1に示すように浸炭部はHv730以上となり、防炭部はHv350以下と何れも熱処理前の素材の硬度と殆ど変わらず、防炭能の優れていることが判明した。尚、 $\text{Na}_2\text{SiO}_3$ や $\text{Na}_4\text{SiO}_4$ などの添加量が5%以下のものは、何れも防炭能が悪く、一方40%以上のものは流動性が悪く塗料化できないことも判明した。従って、本発明の特許請求の範囲を5～40%とした。

## 【0009】

## 【表1】

## 浸炭鋼SCM415に対する浸炭防止試験

塗料の種類	浸炭部の硬度 (Hv)	防炭部の硬度 (Hv)
A	737	341
B	739	341
C	736	344
D	738	348
E	738	343
F	733	342
G	738	340
H	735	345
I	735	340
J	741	348
K	739	347
L	736	343

【0010】

【発明の効果】これまで市販されている水ガラス系の防炭塗料は、すべて2回重ね塗りをし、塗膜厚みを約0.4mm以上にする必要があったが、本発明の塗料は1回\*

\*塗りで、その塗膜厚みが約0.2mmで充分防炭能を発揮することが判明した。従って、塗料および工賃が半分になるものでその経済効果が大きい。